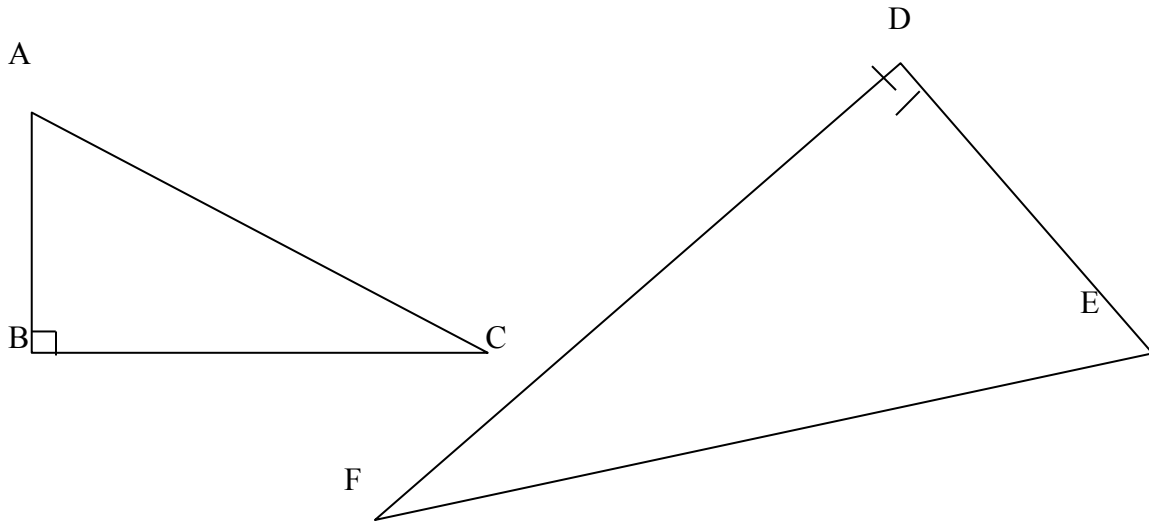


Applications

Lurking among your variations are some figures which at first glance look alike, but are actually quite different from each other. Use valid forms of spatial and proportional reasoning to answer the following question:

1. The triangles below are similar.



- a. Corresponding sides are in relatively the same location. Name the pairs of corresponding sides.
- b. Corresponding angles are also in relatively the same location. Name the pairs of corresponding angles.

Knowledge of the concepts and relationships of number systems is an important mathematical concept. Deductive reasoning uses premises which are true to reach a conclusion that must also be true. Use deductive reasoning to ensure that the conclusions you reach are true based upon the premises held.

2. Use the lab sheet and graph paper provided to draw the variations of figures 2 through 4. After drawing the four figures, compare them to the original. Which figures are similar? Which are not similar?
3. For each of the three figures on the lab sheet and graph paper, compare variation 1 with variation 2, what is the relationship between the lengths of the sides of these two figures? What is the relationship between the corresponding angles?
4. For each of the geometric figures on the lab sheet and the graph paper, compare the original figure with variations 3 and 4. What do you notice about the type of shape; the lengths of the sides. What things are the same? What things are different? Think about the general shape, the length of sides, and the angles of each figure. Write a definition for what it means to be mathematically similar.

Inductive reasoning uses premises which are true to support a conclusion, but that does not necessarily ensure it. For example, if every crow that is seen is black, it can be said that all crows are black. Use inductive reasoning to answer the following:

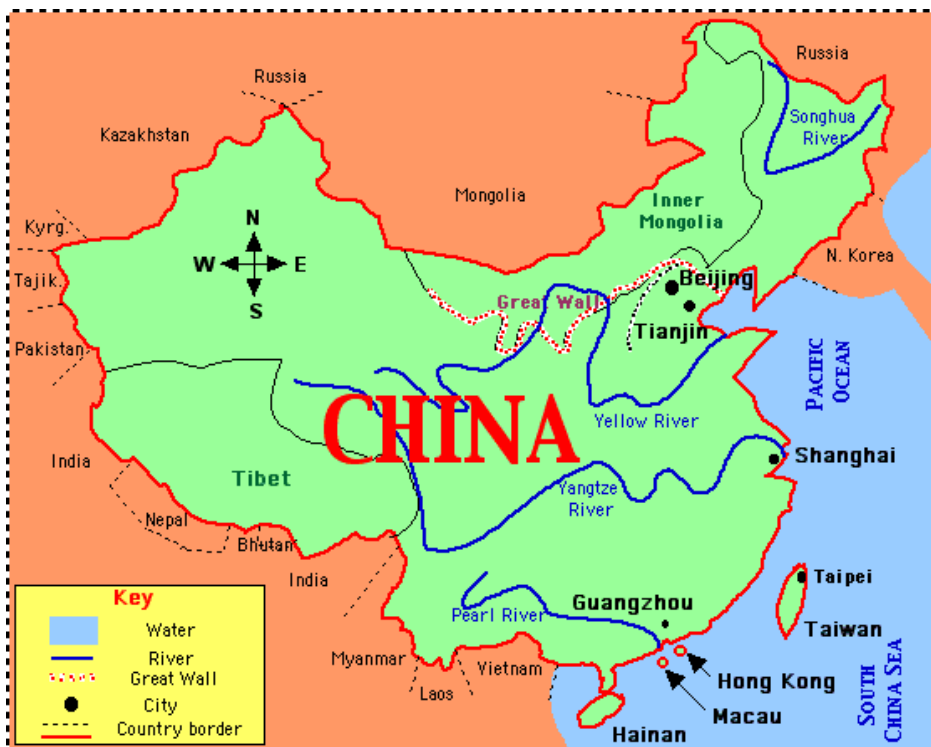
5. Name the next three numbers in the pattern:

0, 1, 3, 6, 10, ...

Proportional reasoning plays an important role in mathematics in everyday life in a way similar to the way language analogies operate. Use proportional reasoning to answer the following question:

6. Below is a map of China. The scale for the map is 1 centimeter = 450 kilometers. This means that 1 centimeter on the map represents 450 kilometers in the real world. Using this scale and a ruler, estimate these distances:

- a. From Beijing to Shanghai
- b. From Tianjin to Guangzhou



(from Google Images)

Invalid reasoning is one of the major reasons that students get wrong answers on mathematics problems. Explain the invalid reasoning used in the following problem:

7. During a math quiz on polygons, a student labeled a square as a quadrilateral and a rhombus, but not as a rectangle. Explain why this conclusion was not fully correct.